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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/713,552
Filing Date: November 14, 2003
Appellant(s): DENG ET AL.

John E. Carlson, Reg No. 37,794
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed October 15, 2008 appealing from the Office action mailed April 15, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,612,580	Janonis et al	3-1997
5,633,539	Tassitino, Jr.	5-1997
5,939,799	Weinstein	8-1999

6,295,215

Faria

9-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 8-14, 17-23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janonis (US 5,612,580) in view of Tassitino (US 5,633,539) and Weinstein (US 5,939,799).

With respect to claim 1, Janonis discloses the apparatus necessary to complete the method for responding to electrical power source irregularities in an uninterruptible power supply system (fig 1, item 10; col. 2, lines 26-37) utilizing a rechargeable DC power supply as backup power (item 28; col. 3, lines 5-24) comprising:

providing a UPS system comprising an AC source converter (item 32) connectable to an AC source and an AC load converter (item 36) connectable to a load, wherein the converters are interconnected by a DC bus;
monitoring bus voltage (items 12, 20; col. 2, lines 39-43; col.3, lines 25-35);
establishing a first DC bus voltage threshold indicative of a first power source irregularity and a second DC bus voltage threshold indicative of a second

and distinct power source irregularity, wherein the first threshold is greater than the second threshold (col. 3, lines 36-45, col. 4, lines 9-15);

comparing the DC bus voltage to the first and second thresholds (col. 2, lines 39-43; col. 3, lines 43-45);

commuting electrical power only from the DC power supply to the DC bus when the DC bus voltage is less than the second threshold and for disabling the source converter (col. 4, lines 16-25).

Janonis does not expressly disclose:

A. three phase AC source and load;

B. monitoring a DC voltage on the DC bus;

C. commuting electrical power from both the power source and from the DC power supply at the same time to the DC bus when the DC bus voltage is intermediate the first and second thresholds.

A. Tassitino discloses an uninterruptible power supply system (figure 1, item 100), comprising a three phase AC source converter (item 160) connectable to a three phase AC power source (item 110) and a three phase AC load converter (item 130) connectable to a three phase load (item 170), wherein the converters are interconnected by a DC bus (connection between items 160, 262, and 130). See also column 3, lines 17-34.

Janonis and Tassitino are analogous because they are from the same field of endeavor, namely uninterruptible power supplies that comprise backup DC power supplies with adjustable output voltages (Tassitino, col. 3, lines 35-67). At the time of

the invention by applicants, it would have been obvious to a person of ordinary skill in the art to combine the uninterruptible power supply system comprising the off-line and on-line modes disclosed in Janonis with the 3 phase power supply, converters, and load disclosed in Tassitino in order to support a system that utilizes three-phase AC power, since it is a common power output delivered by utility companies.

B. Weinstein discloses a UPS where the input power can be measured at the both the AC input (item 123) and downstream of a rectifier on a DC bus (item 122)(col. 2, lines 2-12; col. 3, lines 6-14 and 36-39). Janonis, Tassitino and Weinstein are analogous because they are from the same field of endeavor, namely uninterruptible power supplies. At the time of the invention by applicants, it would have been obvious to one skilled in the art to combine the AC voltage detecting UPS systems disclosed in Janonis and Tassitino with the DC voltage detecting UPS disclosed in Weinstein in order to detect a failure of the AC/DC converter (Weinstein, col. 3, lines 36-39).

As discussed above, Janonis only requires measuring the voltage level to detect a brownout or other event that requires activating the backup power supply. The Janonis system will activate the backup power supply even without a detected change in AC frequency.

C. Tassitino also discloses that the input voltage is measured against two thresholds. Only DC power is supplied when the AC input has failed (col. 6, lines 18-20), both input AC and backup DC power are supplied when the DC bus (load current) is between two thresholds (0 volts < measured voltage < full power; col. 5, line 51 to col.

6, line 17), and only AC input power is supplied during normal operation (col. 6, line 32-36).

With respect to claims 2-5 and 8-9, the apparatus necessary to complete the recited methods are rejected, as provided below in the rejection of claims 11-14 and 17-18, respectively.

With respect to claim 10, Janonis, Tassitino and Weinstein disclose the recited apparatus, as discussed above in the rejection of claim 1. Further, Janonis discloses the commuting means for commuting electrical power from at least one of the power source and the DC power supply (supplies only the power source) when the bus voltage is intermediate the two thresholds ("first online mode"; col. 3, line 29 to col. 4, line 3).

With respect to claim 11, Tassitino further discloses the three-phase AC power source is a public power grid (col. 3, lines 17-20). The common method of transmitting power from a public utility to the customer is through a public power grid.

With respect to claim 12, Janonis further discloses the first power source irregularity is a transitory source instability (col. 3, lines 43-45, "sag or frequency deviation") and the second power source irregularity is a power source failure (col. 4, lines 9-15). The second threshold value in Janonis is lower than the first threshold value. Therefor, an input voltage that falls below the second threshold value may be considered more severe, and labeled a "power source failure." It is also inherent in Janonis that a power source failure that results in a full loss of supplied power to the UPS would be recognized as falling below the second threshold level, and would trigger the second on-line mode of operation.

With respect to claim 13, Janonis further discloses where the first power source irregularity is a transitory source instability and the second power source irregularity is a power source failure, as discussed above.

With respect to claim 14, Janonis further discloses:

grid failure establishing means (col. 3, lines 29-30) for establishing predetermined quality criteria for acceptable power source quality;

power source monitoring means (col. 3, lines 30-35) for monitoring source voltage and current parameters for each phase on an input side of the source converter;

and power source failure commuting means (col. 4, lines 17-19) for commuting electrical power only from the DC power supply to the DC bus and disabling the source converter when the source voltage fails to meet the predetermined quality criteria indicative of a power source failure.

As discussed above, the UPS in Janonis senses the input AC voltage before it is converted to DC, and it would be obvious to apply the three-phase AC UPS system disclosed in Tassitino to the AC UPS system disclosed in Janonis.

With respect to claim 17, Janonis further discloses a plurality of rechargeable DC power supplies (item 28; col. 2, line 67 to col. 3, line 4) connected in parallel to each other and to the DC bus (interconnection between items 32-34-36), and sequential DC power control means (col. 9, lines 8-19) for using power from each DC power supply sequentially when a power source irregularity is indicated. Janonis discloses that as

more power is required to compensate for irregularities in the AC input voltage, more DC power supplies are activated.

Although Janonis does not expressly disclose that the rechargeable DC power supplies are connected in parallel to each other, it would have been obvious to combine each of the batteries in the Janonis battery array in parallel. The motivation for doing so would have been to increase the current supplied to the DC bus while maintaining a constant voltage. It is known in the art that voltage sources arranged in parallel act to add their respective current outputs while outputting a constant voltage level.

With respect to claim 18, Janonis further discloses the first threshold is 95-105 volts AC and the second threshold is 75 volts AC. As discussed above, it would be obvious that sensing the AC input voltage or converted DC input voltage would yield the same results regarding irregularities in the power source. Persons of ordinary skill in the art would extend or expand the operating threshold range to accommodate higher voltages for systems and loads having different design requirements. It has been decided that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 223, 235 (CCPA 1955).

With respect to claim 19, Janonis, Tassitino and Weinstein disclose the recited method, as discussed above in the rejection of claim 1. Claim 19 differs from claim 1 by not reciting three phrase AC power. The remaining method steps are obvious over the references as stated above.

With respect to claim 20, Janonis further discloses establishing predetermined quality criteria for acceptable power source quality (col. 3, lines 43-45), monitoring power source voltage and current parameters on an input side of the source converter (col. 3, lines 29-31) and commuting electrical power only from the DC power supply to the DC bus and disabling the source converter when the power source voltage fails to meet the predetermined quality criteria indicative of a power source failure (col. 4, lines 9-15). The Janonis UPS monitors the amplitude and frequency of in the input voltage to determine if it meets the quality criteria.

With respect to claim 21, Janonis discloses an apparatus that corresponds to the method of claim 19, as discussed above in the rejection of claim 1.

With respect to claim 22, Janonis discloses the recited limitations, as discussed above in the rejection of claim 12.

With respect to claim 23, Janonis further discloses a number of power source voltage sensors (fig 1, item 18; col. 2, lines 39-43) coupled to sense a source voltage for each phase on an input side of the source converter, and a number of power source current sensors coupled to sense a source current for each phase the input side of the source converter (item 18), wherein the controller is further configured to *commute* electrical power only from the DC power supply to the DC bus and disabling the source converter when the source voltage fails to meet a predetermined quality indicative of a power source failure (col. 4, lines 9-15).

Janonis discloses a line condition sensor (item 18) for measuring diagnostic information on the power source line. While Janonis does not expressly disclose that

the condition sensor is either a voltage or current sensor, it would have been obvious to a person of ordinary skill in the art that the condition sensor meets the requirements of both. In the recited apparatus, the voltage and current sensors are interchangeable. They perform the same function and yield proportional results regarding the quality of the power source.

Further, Janonis discloses a condition sensor, but does not expressly disclose that the condition sensor comprises *a number* of voltage and/or current sensors. It would have been obvious to one having ordinary skill at the time the invention was made to place a plurality of voltage and/or current sensors at the input side of the source converter, and to place a voltage and/or current sensor to measure each AC phase line, because the mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8 (1977).

With respect to claim 25, Janonis discloses the rechargeable batteries, as discussed above in the rejection of claim 17.

3. Claims 6-7, 15-16, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janonis, in view of Tassitino, Weinstein and Faria (US 6,295,215).

With respect to claims 6-7, Janonis and Tassitino disclose the apparatus necessary to complete the recited method, as discussed below in the rejections of claims 15 and 16, respectively.

With respect to claim 15, Janonis and Tassitino do not expressly disclose instantaneous monitoring means for monitoring instantaneous load voltage and current

parameters for each phase on an output side of the load converter, load power calculating means for calculating a load power demand value from the instantaneous parameters, transient power supplying means for supplying power to the DC bus from the DC power supply when a transient power source irregularity is indicated, and command signal generating means for generating a command signal to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

Faria discloses an uninterruptible power supply apparatus comprising:

instantaneous monitoring means (figure 3, item 325, 324; col. 6, lines 23-27) for monitoring instantaneous load voltage and current parameters for each phase on an output side of the load converter;

load power calculating means (figure 3, item 325, 322; col. 6, lines 27-3) for calculating a load power demand value from the instantaneous parameters;

transient power supplying means (col. 6, lines 11-15) for supplying power to the DC bus from the DC power supply when a transient power source irregularity is indicated;

and command signal generating means (col. 6, lines 37-45) for generating a command signal to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

Faria discloses an "economy mode", in which both the AC power source and DC power supply contribute to the output voltage. It is obvious that any sag or drop in the

voltage level of the AC power source will be supported by an increase in the voltage output of the DC power supply. Therefor, the “economy mode” compensate disclosed in Faria comprises a command signal generating means.

Janonis, Tassitino, Weinstein and Faria are analogous because they are from the same field of endeavor, namely uninterruptible power supplies that comprise backup DC power supplies with adjustable output voltages. At the time of the invention by applicants, it would have been obvious to a person of ordinary skill in the art to combine the three-phase AC uninterruptible power supply system comprising the two thresholds disclosed in Janonis, Tassitino and Weinstein with load converter output current and voltage sensing disclosed in Faria in order to detect a sag, drop, or irregularity in input voltage. The AC input voltage may be calculated based on the sensed load voltage minus the DC power supply voltage, which is known.

With respect to claim 16, Faria, as discussed above, discloses the apparatus comprises instantaneous monitoring means for monitoring instantaneous load voltage and current parameters for each phase on an output side of the load converter, load power calculating means for calculating a load power demand value from the instantaneous parameters, transient power supplying means for supplying power to the DC bus from the DC power supply when a transient power source irregularity is indicated, and command signal generating means for generating a command signal to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

With respect to claim 24, Faria discloses an uninterruptible power supply apparatus comprising:

a number of voltage sensors (figure 3, item 325, 324; col. 6, lines 23-27) coupled to instantaneously sense load voltage for each phase of an output side of the load converter;

a number of current sensors (figure 3, item 325, 324) coupled to instantaneously sense load current for each phase on an output side of the load converter, wherein the controller is further configured to calculate a load power demand value (figure 3, item 325, 322; col. 6, lines 27-3) from the instantaneous load voltage and the instantaneous load current;

a transient power switch (col. 6, lines 11-15) selectively operable to couple the DC power supply to the DC bus to supply from the DC power supply when a transient power source irregularity is indicated; wherein the controller is further configured to generate a command signal (col. 6, lines 37-45) to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

The plurality of voltage/current sensors, coupled to sense the load for each phase of the output side of the load converter, is obvious in view of the duplication of parts, as discussed in the rejection of claim 23. Further, the interchangeability of voltage and current sensors would be obvious to a person skilled in the art, as discussed above.

(10) Response to Argument

The Examiner agrees that Janonis discloses an uninterruptible power supply ("UPS") that measures AC voltage and frequency of the input power supply. The Janonis UPS does not measure the DC bus voltage (Brief, page 5, paragraphs 1-2). Weinstein discloses that DC bus voltage can be measured to detect a failure of the input power source (Weinstein col. 2, lines 2-12). Weinstein also discloses that the AC voltage at the input to a rectifier can be measured as an alternative to measuring the DC voltage at the output of the rectifier (Weinstein col. 3, lines 6-14). Both Weinstein embodiments produce the same result; detecting the status of the input power supply.

The Examiner maintains that Janonis need only use one of the disclosed power traits (Janonis, col. 2, lines 37-43) and still maintain its disclosed functionality (Brief, paragraph 3). Contrary to appellants' remarks, Janonis consistently refers to the detection of input amplitude and frequency in the alternative ("or"). Janonis discloses that the sensor (figure 1, item 18) senses a disturbance in the input power based only on the voltage amplitude characteristic (col. 3, lines 29-45, lines 53-59; col. 4, lines 9-15). While Janonis detects frequency (col. 3, lines 34-35, lines 41-45), frequency deviation is not used to determine if the input voltage amplitude is above or below the defined threshold voltages (75, 95 VAC; col. 3, lines 36-45).

As stated in appellants' arguments (Brief, page 5, last paragraph), Janonis alters its behavior when any of the characteristics indicates an irregularity. "Any" indicates that only one characteristic needs to indicate the irregularity (i.e. amplitude). Janonis

does not indicate that a change in several characteristics (amplitude, frequency, etc.) is ever required to be detected simultaneously.

Similarly, Janonis' claim 6 (Brief, top of page 6) recites that amplitude or frequency deviation determine the UPS operating mode (indent c).

Janonis discloses measuring input AC voltage amplitude to determine the status of the input power source. Weinstein discloses that measuring the AC voltage amplitude or the DC voltage amplitude (input and output of a rectifier) are equivalent for detecting the status of the input power source. Thus, contrary to appellants' arguments, the combination of the references does not destroy the functionality and elements of the claims of Janonis.

One skilled in the art would understand that the availability of input power can be detected at any point along the path that connects the input and output of the UPS system. Although a UPS may include converters that change the voltage level, a designer would be aware of the gain characteristics of these converters and would be able to calculate the voltages expected at various nodes within the UPS. One skilled in the art would understand that an increase in voltage amplitude at the input would result in a proportional increase in voltage at the mid-point (DC bus) and the output of the UPS system. Similarly, a decrease can be detected at any node within the UPS system. Lastly, by sensing 0-volt amplitude at any node of the UPS, one can deduce that the input power supply has failed. While it is also possible that an intervening component has failed (thus no output voltage), such a limitation is not presented in the pending claims.

Regarding the rejections of claims 6-7, 15-16 and 24, appellants only argue that the claims would be allowable based on their dependence on claims 1-5, 8-14, 17-23 and 25. These dependent claims are not allowable based on the combination of references, as discussed above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Adi Amrany/

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